

Part III - Administrative, Procedural, and Miscellaneous

Section 45Z Clean Fuel Production Credit; Emissions Rates; Request for Comments

Notice 2025-11

SECTION 1. PURPOSE

This notice provides initial guidance on emissions rates under § 45Z(b)(1)(B) of the Internal Revenue Code (Code)¹ for the clean fuel production credit determined under § 45Z (§ 45Z credit). This notice also requests comments from the public related to emissions rates for the § 45Z credit to assist the Department of the Treasury (Treasury Department) and the Internal Revenue Service (IRS) in developing additional guidance. See *also* Notice 2025-10, this Bulletin, that describes forthcoming proposed regulations that the Treasury Department and the IRS intend to issue that would address definitions, emissions rates, credit eligibility, calculation of the credit amount, registration, certification, claim filing, and required recordkeeping.

The Treasury Department and the IRS developed this notice and Notice 2025-10 in consultation with the Department of Energy (DOE), the Environmental Protection Agency (EPA), the United States Department of Agriculture, and other federal agencies.

¹ Unless otherwise specified, all references to “section” or “§” are references to sections of the Code.

SECTION 2. BACKGROUND

.01 In general. Section 45Z, added to the Code by § 13704 of Public Law 117-169, 136 Stat. 1818, 1997 (August 16, 2022), commonly known as the Inflation Reduction Act of 2022, provides an income tax credit for clean transportation fuel produced domestically after December 31, 2024, and sold by December 31, 2027. The § 45Z credit is a general business credit under § 38.

A taxpayer must meet several requirements to be eligible to claim the § 45Z credit. Generally, a taxpayer must: (1) produce a transportation fuel that has a lifecycle greenhouse gas emissions rate (emissions rate) of not greater than 50 kilograms (kg) of carbon dioxide equivalent based on relative global warming potential (CO₂e) per million British thermal units (mmBTU) and that satisfies certain suitability and coprocessing requirements; (2) produce the fuel in the United States at a qualified facility; (3) be registered as a producer of clean fuel under § 4101 at the time of production; and (4) sell the fuel to an unrelated person in a qualifying manner during the taxable year. See § 45Z(a)(1) & (4), (d)(4)-(5)(A), and (f)(1). A taxpayer producing a transportation fuel that is sustainable aviation fuel (SAF transportation fuel) must also provide unrelated party certification demonstrating compliance with certain requirements. See § 45Z(f)(1)(A)(i)(II).

For purposes of § 38, the § 45Z credit is an amount equal to the product of (A) the applicable amount per gallon (or gallon equivalent) with respect to any transportation fuel which is produced by the taxpayer at a qualified facility and sold in the manner described in § 45Z(a)(4) during the taxable year and (B) the emissions factor for such fuel as determined under § 45Z(b). See § 45Z(a)(1).

For a fuel to be eligible for the § 45Z credit, one requirement is that it must have an emissions rate that is not greater than 50 kg of CO₂e per mmBTU. See § 45Z(d)(5)(A)(ii). This is the baseline emissions rate. The amount of the credit is based on the transportation fuel's emissions factor, which is a calculation of the fuel's emissions rate against the baseline emissions rate. See § 45Z(b)(1)(A)(i).

.02 Emissions factor. The emissions factor for a transportation fuel is the quotient of 50 kilograms of CO₂e per mmBTU, minus the emissions rate for such fuel, divided by 50 kilograms of CO₂e per mmBTU. See § 45Z(b)(1)(A)(i). Expressed mathematically, the calculation is as follows: Emissions factor = (50 kg of CO₂e per mmBTU - emissions rate in kg of CO₂e per mmBTU) ÷ 50 kg of CO₂e per mmBTU.

Under § 45Z(b)(2), if any amount determined under § 45Z(b)(1)(A) is not a multiple of 0.1, such amount must be rounded to the nearest multiple of 0.1.

.03 Applicable amount. Section 45Z(a)(2) and (3) provide the applicable amounts for transportation fuels. Section 45Z(c)(1) provides that for calendar years beginning after 2024, the applicable amounts in § 45Z(a)(2) and (3) must each be adjusted by multiplying such amount by the inflation adjustment factor for the calendar year in which the sale of the transportation fuel occurs. Section 45Z(c)(2) provides that the inflation adjustment factor for the § 45Z credit is the inflation adjustment factor determined and published by the Secretary of the Treasury or her delegate (Secretary) pursuant to § 45Y(c), determined by substituting "calendar year 2022" for "calendar year 1992" in § 45Y(c)(3).² The Treasury Department and the IRS intend to provide

² Accordingly, the inflation adjustment factor for purposes of § 45Z means, with respect to a calendar year, a fraction the numerator of which is the GDP implicit price deflator for the preceding calendar year

guidance on the inflation adjustment factor for the 2025 calendar year at a later time. Such guidance will be published in the Internal Revenue Bulletin.

04. Emissions rates. Section 45Z divides transportation fuel into two categories: non-SAF transportation fuel and SAF transportation fuel. Section 45Z(b)(1)(B)(ii) and (iii) provides the methods for determining emissions rates for non-SAF transportation fuel and SAF transportation fuel.

Section 45Z(b)(1)(B)(i) directs the Secretary, subject to § 45Z(b)(1)(B)(ii) and (iii), to annually publish a table that sets forth the emissions rates for similar types and categories of transportation fuels based on the amount of lifecycle greenhouse gas emissions³ as described in § 211(o)(1)(H) of the Clean Air Act (42 U.S.C. 7545(o)(1)(H)) as in effect on August 16, 2022 (CAA)⁴ for such fuels, expressed as kg of CO₂e per mmBTU. This notice contains the initial table that sets forth such emissions rates for purposes of the § 45Z credit. See section 4.05 of this notice and the appendix to this notice.

Regarding the determination of emissions rates, § 45Z(b)(1)(B)(ii) provides that in the case of non-SAF transportation fuel, the lifecycle greenhouse gas emissions of

and the denominator of which is the GDP implicit price deflator for the calendar year 2022. In this context, the term “GDP implicit price deflator” means the most recent revision of the implicit price deflator for the gross domestic product as computed and published by the Department of Commerce before March 15 of the calendar year. See § 45Y(c)(3).

³ Section § 211(o)(1)(H) of the Clean Air Act defines the term “lifecycle greenhouse gas emissions” as “the aggregate quantity of greenhouse gas emissions (including direct emissions and significant indirect emissions such as significant emissions from land use changes), as determined by the [EPA] Administrator, related to the full fuel lifecycle, including all stages of fuel and feedstock production and distribution, from feedstock generation or extraction through the distribution and delivery and use of the finished fuel to the ultimate consumer, where the mass values for all greenhouse gases are adjusted to account for their relative global warming potential.” See *also* 42 U.S.C. 7602(a).

⁴ This notice cites to the CAA as added by § 1501(a)(2) of the Energy Policy Act of 2005, Public Law 109-58, 119 Stat. 594, 1067 (2005) and amended by § 202(a)(1) of the Energy Independence and Security Act of 2007, Public Law 110-140, 121 Stat. 1492, 1521-22 (2007).

such fuel must be based on the most recent determinations under the Greenhouse gases, Regulated Emissions, and Energy use in Transportation model developed by the Argonne National Laboratory (ANL), or a successor model as determined by the Secretary.

Section 45Z(b)(1)(B)(iii) provides that for SAF transportation fuel, the lifecycle greenhouse gas emissions of such fuel is determined in accordance with (I) the most recent Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA) which has been adopted by the International Civil Aviation Organization (ICAO) with the agreement of the United States or (II) any methodology similar to the most recent CORSIA that satisfies the criteria under § 211(o)(1)(H) of the CAA.

Section 3 of this notice provides background on the methodologies used to determine emissions rates.

Section 4 of this notice instructs taxpayers how to calculate emissions rates using either (1) determinations under the most recent version of the 45ZCF-GREET model or (2) determinations from fuel pathways approved under the most recent CORSIA Default Life Cycle Emissions Values for CORSIA Eligible Fuels lifecycle approach (CORSIA Default) or the most recent CORSIA Methodology for Calculating Actual Life Cycle Emissions Values lifecycle approach (CORSIA Actual).

Section 45Z(b)(1)(D) provides that in the case of any transportation fuel for which an emissions rate has not been established under § 45Z(b)(1)(B), a taxpayer producing such fuel may file a petition with the Secretary for determination of the emissions rate with respect to such fuel, also known as a provisional emissions rate (PER). See section 4.05 and 4.06 of this notice.

SECTION 3. ALLOWED METHODOLOGIES FOR DETERMINING EMISSIONS RATES

.01 CORSIA Program. Emissions rates for SAF transportation fuels are determined under the CORSIA program based on the modeling of the fuel lifecycle, including all stages of fuel and feedstock production through to the end use of the finished fuel, to calculate and reduce greenhouse gas emissions from international aviation. In 2016, ICAO adopted CORSIA, which is set out in Annex 16 - Environmental Protection: Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA) (2018), <https://elibrary.icao.int/home/product-details/229739>.

Using the CORSIA program, there are two ways of obtaining the lifecycle emissions value of a SAF transportation fuel: (1) CORSIA Default and (2) CORSIA Actual. Additional information about CORSIA Default and CORSIA Actual is available at <https://www.icao.int/environmental-protection/CORSIA/Pages/CORSIA-Eligible-Fuels.aspx>.

.02 45ZCF-GREET model.

Administration of the § 45Z credit requires a determination of the emissions rates of different types and categories of fuels consistently and accurately, including fuels made from different pathways and primary feedstocks (as provided in the emissions rate table). ANL developed, and the DOE published, the 45ZCF-GREET model to determine emissions rates for the § 45Z credit that also meets three key parameters: (1) user-friendliness and consistency, (2) technical robustness of the pathways represented, and (3) consistency with the other requirements of § 45Z.

The first version of the 45ZCF-GREET model, anticipated to be released on January 10, 2025, is available at <https://www.energy.gov/eere/greet>. The first version of the 45ZCF-GREET model includes the most commonly used types and categories of fuel that are anticipated to meet the eligibility requirements to claim the § 45Z credit. Additional types and categories of fuel may be added in future versions of the 45ZCF-GREET model. See the 45ZCF-GREET User Manual⁵ for additional background.

SECTION 4. DETERMINATION OF EMISSIONS RATES

.01 Most recent determinations under the 45ZCF-GREET model. Taxpayers must use the most recent determinations under the 45ZCF-GREET model for non-SAF and SAF transportation fuels. The term “the most recent determinations” means determinations under the latest version of the 45ZCF-GREET model (described in section 3.02 of this notice) that is publicly available on the first day of the taxable year in which the transportation fuel for which the taxpayer is claiming the § 45Z credit was produced. See *also* Notice 2025-10.

If a version of the 45ZCF-GREET model adds a type or category of fuel after the first day of a taxable year, taxpayers must use such version of the 45ZCF-GREET model for the new type or category of fuel for the entire taxable year. Additionally, if an updated version of the 45ZCF-GREET model becomes publicly available after the first day of the taxable year of production (but still within such taxable year), then the taxpayer may, in its discretion, treat such updated version as the most recent version of the 45ZCF-GREET model.

⁵ The 45ZCF-GREET User Manual, along with the 45ZCF-GREET model, is available at: <https://www.energy.gov/eere/greet>.

.02 Most recent version of CORSIA Default or CORSIA Actual. For purposes of § 45Z(b)(1)(B)(iii)(I), the term “most recent” means the latest version of CORSIA Default or CORSIA Actual (described in section 3.01 of this notice) that is publicly available on the first day of the taxable year in which the SAF transportation fuel for which the taxpayer is claiming the § 45Z credit was produced. Additionally, if an updated version of CORSIA Default or CORSIA Actual becomes publicly available after the first day of the taxable year of production (but still within such taxable year), then the taxpayer may, in its discretion, treat such updated version as the most recent version of CORSIA Default or CORSIA Actual.

At the time of publication of this notice, the most recently published versions of CORSIA Default (Sixth Edition, October 2024) and CORSIA Actual (Fifth Edition, October 2024) are both available at: <https://www.icao.int/environmental-protection/CORSIA/Pages/CORSIA-Eligible-Fuels.aspx>

.03 Determining emissions rates for non-SAF transportation fuels. If an emissions rate for a non-SAF transportation fuel is established under § 45Z(b)(1)(B)(i) (which means that the type and category of non-SAF transportation fuel is established in the most recent determinations under the emissions rate table), a taxpayer producing such type and category of fuel must use the most recent determinations under the emissions rate table to determine the fuel’s emissions rate. See section 4.06 of this notice if the non-SAF transportation fuel is not established in the most recent determinations under the 45ZCF-GREET model.

.04 Determining emissions rates for SAF transportation fuel. If an emissions rate for a SAF transportation fuel is established under § 45Z(b)(1)(B)(i) (which means that

the type and category of SAF transportation fuel is established in the most recent determinations under the emissions rate table), a taxpayer producing such type and category of fuel must determine the SAF emissions rate pursuant to (1) an analysis using the most recent version of CORSIA Default or CORSIA Actual (see section 4.02 of this notice or (2) an analysis using the most recent determinations under the 45ZCF-GREET model (see section 4.01 of this notice). For a given SAF transportation fuel, a taxpayer must use the same methodology for determining the emissions associated with all stages of fuel feedstock production and distribution.

If the Treasury Department and the IRS conclude that an additional methodology qualifies under § 45Z(b)(1)(B)(iii)(II), instructions for how to use such methodology will be provided in additional guidance.

See section 4.06 of this notice if a type or category of SAF transportation fuel is not established in the most recent version of CORSIA Default or CORSIA Actual.

.05 Initial emissions rate table. The initial emissions rate table required by § 45Z(b)(1)(B)(i) is provided in the appendix of this notice. Each emissions rate determined under section 4 of this notice must be determined by calculating the lifecycle greenhouse gas emissions (as defined in § 211(o)(1)(H) of the CAA) for such type and category of fuel and must be expressed in kg of CO₂e per mmBTU.

When calculating the emissions rate for purposes of determining the amount of the § 45Z credit, the taxpayer must accurately enter all information requested for the allowed methodology and must follow the publicly available instructions provided by the relevant authority (the DOE or ICAO). For example, a taxpayer calculating an emissions rate using the most recent determinations under the 45ZCF-GREET model

must enter all information requested within the interface of the 45ZCF-GREET model and must follow the instructions in the most recent version of the 45ZCF-GREET User Manual.

.06 Provisional emissions rate (PER). Section 45Z(b)(1)(D) provides that for any transportation fuel for which an emissions rate has not been established under § 45Z(b)(1)(B), meaning a type or category of fuel that is not established in the most recent determinations under the 45ZCF-GREET model (for non-SAF transportation fuel) or that is not established in the most recent determinations under the 45ZCF-GREET model or the most recent version of CORSIA Default or CORSIA Actual (for SAF transportation fuel), a taxpayer producing such type or category of fuel may file a petition with the Secretary for determination of a PER. A taxpayer requesting a PER is referred to as an “applicant.”

The Treasury Department and the IRS intend to provide guidance related to the PER petition process, including the process for obtaining an emissions value from the DOE that an applicant will use to request a PER determination, at a later time. The IRS will not accept requests for PER determinations for the § 45Z credit, and the DOE will not issue emissions values, until after such guidance is published. For purposes of the § 45Z PER process, an emissions value is a value obtained from the DOE setting forth the DOE’s analytical assessment of the lifecycle greenhouse gas emissions rate associated with the production of a type of transportation fuel using a particular primary feedstock and pathway.

.07 New emissions rates (including PER) apply on January 1, 2025. The emissions rate for any new type or category of fuel established on the applicable

emissions rate table or determined through the PER process will apply on January 1, 2025, regardless of when the Treasury Department and the IRS publish guidance establishing an emissions rate or PER.

SECTION 5. DEFINITIONS AND ADDITIONAL GUIDANCE

Terms used in this notice have the same meaning as in § 45Z and in the appendix to Notice 2025-10. For additional guidance regarding the § 45Z credit, see Notice 2025-10.

SECTION 6. REQUEST FOR COMMENTS

.01 General request for comments. The Treasury Department and the IRS generally request comments about all aspects of this notice.

.02 Specific request for comments. The Treasury Department and the IRS specifically request comments on how the fuel pathways approved under the EPA's Renewable Fuel Standards Program (RFS) could be adapted for purposes of the emissions rate table if the Treasury Department and the EPA were to determine that the RFS program is a methodology "similar" to CORSIA that also satisfies the criteria under § 211(o)(1)(H) of the CAA (as required by § 45Z(b)(1)(B)(iii)(II)).

SECTION 7. SUBMISSION OF COMMENTS

Written comments should be submitted by April 10, 2025. The subject line for the comments should include a reference to Notice 2025-11. Comments may be submitted in one of two ways:

(1) electronically via the Federal eRulemaking Portal at <http://www.regulations.gov> (type IRS-2025-0002 in the search field on the regulations.gov homepage to find this notice and submit comments); or

(2) by mail to: Internal Revenue Service, CC:PA:01:PR (Notice 2025-11), Room 5203, P.O. Box 7604, Ben Franklin Station, Washington, DC 20044.

All commenters are strongly encouraged to submit comments electronically. The Treasury Department and the IRS will publish for public availability any comment submitted electronically, or on paper, to its public docket on www.regulations.gov.

SECTION 8. EFFECTIVE DATE

This notice is effective January 10, 2025.

SECTION 9. DRAFTING INFORMATION

The principal author of this notice is Camille Edwards Bennehoff of the Office of Associate Chief Counsel (Passthroughs & Special Industries). For questions regarding this notice, contact Ms. Edwards Bennehoff at (202) 317-6855 (not a toll-free number).

Appendix
Section 45Z Emissions Rate Table
For Use For Fuel Produced After 12/31/2024

Type of Fuel	Category of Fuel		Determination of Emissions Rate (calculated to be expressed in kg of CO ₂ e/mmBTU)
	Pathway	Primary feedstock	
Ethanol	Fermentation	U.S. corn starch	Calculate using the most recent determinations under the 45ZCF-GREET model (see section 4.01 of this notice).
		U.S. sorghum grain	
Brazilian sugarcane (for use as feedstock for SAF-Alcohol-to-Jet (ATJ) only)			
Hydrolysis and Fermentation	U.S. corn stover		
Biodiesel	Transesterification	U.S. soybean oil	
		U.S./Canadian canola oil/rapeseed oil	
		U.S. used cooking oil (UCO)	
		Tallow	
		U.S. distillers corn oil (DCO)	
		U.S. carinata oil (intermediate crop)	
		U.S. camelina oil (intermediate crop)	
		U.S. pennycress oil (intermediate crop)	
Renewable Diesel	Hydroprocessed esters and fatty acids (HEFA)	U.S. soybean oil	Calculate using the most recent determinations under the 45ZCF-GREET model (see section 4.01 of this notice).
		U.S./Canadian canola oil/rapeseed oil	
		U.S. UCO	
		Tallow	
		U.S. DCO	

		U.S. carinata oil (intermediate crop)	
		U.S. camelina oil (intermediate crop)	
		U.S. pennycress oil (intermediate crop)	
	ATJ	Ethanol (from fermentation pathways listed above)	
	Gasification and Fischer-Tropsch	U.S. corn stover	
Renewable Natural Gas	Anaerobic Digestion and Biogas Upgrading	U.S. wastewater sludge	Calculate using the most recent determinations under the 45ZCF-GREET model (see section 4.01 of this notice).
		U.S. animal manures	
		U.S. landfill gas	
Propane	HEFA	U.S. soybean oil	Calculate using the most recent determinations under the 45ZCF-GREET model (see section 4.01 of this notice).
		U.S./Canadian canola/rapeseed oil	
		U.S. UCO	
		Tallow	
		U.S. DCO	
		U.S. carinata oil (intermediate crop)	
		U.S. camelina oil (intermediate crop)	
		U.S. pennycress oil (intermediate crop)	
Naphtha	HEFA	U.S. soybean oil	Calculate using the most recent determinations under the 45ZCF-GREET model (see section 4.01 of this notice).
		U.S. /Canadian Canola/rapeseed oil	
		U.S. UCO	
		Tallow	
		U.S. DCO	
		U.S. carinata oil (intermediate crop)	
		U.S. camelina oil (intermediate crop)	
		U.S. pennycress oil (intermediate crop)	

Hydrogen	Various, as defined in the user manual for the most recent 45VH2-GREET model*	Various, as defined in the user manual for the most recent 45VH2-GREET model	Calculate well-to-gate emissions using the most recent determinations under the 45VH2-GREET model; then calculate the full well-to-wheel emissions using the most recent determinations under the 45ZCF-GREET model (see section 4.01 of this notice). See the 45ZCF-GREET User Manual for additional instructions.
Sustainable Aviation Fuel (SAF)	HEFA	U.S. soybean oil	Calculate using one of the following: 1) the most recent determinations under the 45ZCF-GREET model (see section 4.01 of this notice) or 2) the most recent version of CORSIA Default or CORSIA Actual (see section 4.02 of this notice).
		U.S./Canadian canola/rapeseed oil	
		U.S. UCO	
		Tallow	
		U.S. DCO	
		U.S. carinata oil (intermediate crop)	
		U.S. camelina oil (intermediate crop)	
		U.S. pennycress oil (intermediate crop)	
ATJ	Ethanol (from fermentation pathways above)		
Gasification and Fischer-Tropsch	U.S. corn stover		
	Any pathway established in CORSIA Default or CORSIA Actual for a transportation fuel that is SAF that is not represented above.	Any feedstock for a pathway established in CORSIA Default or CORSIA Actual for a transportation fuel that is SAF that is not represented above.	Calculate using the most recent version of CORSIA Default or CORSIA Actual (see section 4.02 of this notice).

*The 45VH2-GREET model and the 45VH2-GREET User Manual are both available at <https://www.energy.gov/eere/greet>.